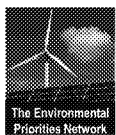


How Modified Hydrofluoric Acid came to be used at the Torrance Refinery¹



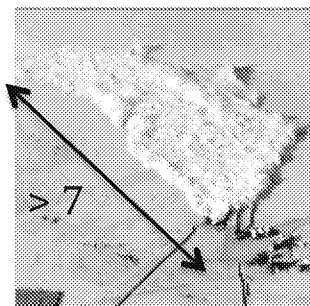
Sally Hayati,
President, The Environmental Priorities Network

July 9, 2015. Last updated: April 8, 2016.

Modified Hydrofluoric Acid or "MHF [is] an extremely toxic and volatile compound that can pose a risk to the public health ... [Eliminating] the use of hydrofluoric acid in any form, [would be] a very substantial benefit. ... The use of MHF should be avoided when... there is a viable alternative."
Then Attorney General Jerry Brown in 2008.¹

I. Release Tests & incidents spur opposition to use of hydrofluoric acid (HF) at Torrance Mobil

1986 Goldfish Tests.² The Amoco and Allied Signal Corporations sponsored the "Goldfish" tests in 1986 in the Nevada desert. 1,000 gallons (8,300 lbs.) of HF were released within two minutes, under temperature and pressure conditions similar to a refinery alkylation unit. Researchers were shocked to discover that *100% of the released HF became airborne* and formed a dense rolling cloud of toxic gas that moved with the wind. Within two minutes sensors showed *lethal HF concentrations 5 miles away from the release point* and concentrations *"immediately dangerous to life and health" as far away as 7.5 miles* (see photo³). Dr. Ronald Koopman of Lawrence Livermore, who conducted the Goldfish tests, said the oil companies did not want the test video⁴ made public and insisted on posting a disclaimer that the test could not be used to estimate what might happen in a real accident. But Dr. Koopman made it clear: "An accident could be this bad. An accident could look like this."⁵



1987-10-30: Marathon Petroleum Co. Texas City, Tex. 65,200 lb. released, 5800 people on 85 city blocks evacuated,⁶ 1,037 people treated at hospital for respiratory (nose, lungs) problems and skin and eye irritations.⁷ This is the largest known release of HF in the US. "There were houses right up against the fence," said HF expert Ronald Koopman of Lawrence Livermore. "*The only thing that saved people was that the [hydrofluoric acid] plume shot 200 feet up in the air, and it went about 900 meters downwind before it actually came down into the neighborhood. If it had squirted out sideways, it would have killed hundreds, if not thousands.*"⁸ Firefighters attempted to saturate the cloud with water sprays, but the toxic cloud that was formed forced [evacuations and hospitalizations]."⁹ As of 1988 people suffered continuing eye problems.

1987-11-24" Torrance Mobil Refinery KOH Treater Fire.¹⁰ 165 lb. HF released, 10 injured, a spectacular fire that burned for two days¹¹ (41-hr fire), and \$17M damages.¹² The cause was an over-pressurized potassium hydroxide propane treatment system that exploded, shearing hydrocarbon and flare lines. "Mobil announced in mid-December that the explosion was caused by an excess amount of hydrofluoric acid in a refinery unit that produces gasoline."¹³ Additional fires resulted, severely damaging the unit.¹⁴ "Leakage of hydrofluoric acid into a tank where it reacted violently with a potassium caustic is the probable cause."¹⁵ The explosion "shot a fireball 1,500 feet into the air, blasted the windows out of nearby houses and generated allegations of broken eardrums, back pain and lung damage."¹⁶ The blast could be heard for miles.¹⁷ Authorities closed Crenshaw Blvd. for several hours on 2 days.¹⁸ Mobil had known that primary alarm systems and monitoring devices were not working. Instead of fixing them, they relied on periodic chemical tests and a backup alarm system. If they had tested *the backup alarm system*, they would have realized *it was not hooked up*.¹⁹ OSHA found four "serious violations" of federal safety regulations,²⁰ where there is a substantial

¹ A pdf file of this report is available at: <http://bit.ly/1T9hLXN>

probability that death or serious physical harm could result and the employer is aware. **Also, in 1988 an explosion during tank cleaning caused 1 death.**²¹

These incidents set off six efforts to eliminate HF: Torrance Measure A, SCAQMD Rule 1410, the Torrance public nuisance lawsuit, the Torrance Chemical Review Board ordinance, a proposed Assembly Bill from Assemblyman Curtis Tucker Jr. (D-Inglewood), and the Torrance-Mobil Consent Decree, as detailed in Section II.

If the 1986 Goldfish tests had not brought HF dangers to the public notice and the large 1987 Marathon release had not occurred, the 1987 release at Mobil would have received little attention. Similar or larger releases have occurred regularly without coverage by the press or public notification from the city. From 1987 to 2014, accidental releases of MHF/HF occurred at the Torrance refinery every year but one, according to ExxonMobil's reports submitted to the EPA Toxics Release Inventory (TRI) program. The total reported release amount was 6,700 lb. for the period.

YEAR	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99
LBS.	750	250	250	380	385	350	350	410	410	430	310	620

=====

YEAR	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'11	'12	'13	'14
LBS.	130	16	81	3	890	170	130	150	27	25	3	3	2	2

The two largest, 890 lb. in 2004 and 750 lb. in 1988, went completely unreported in the press, as did many other significant releases. Although the Torrance Fire Department receives TRI reports, its 1995 report to City Council listed only 8 HF incidents from 1979 to 1995. In fact, there were at least 9 substantial releases 1987 to 1995 alone, and it's likely there were multiple releases from 1979 to 1986. Even when publicly reported, release amounts are consistently understated. The third largest release, 620 lb. in 1999, was reported in the press as "trace amounts of modified hydrogen fluoride." A 1999 Mobil public education pamphlet reported only two releases over a five-year period totaling 298 lb.²² Actually, releases occurred every year during that period, totaling 2,180 lb. ExxonMobil has claimed that the absence of a catastrophic release demonstrates that MHF is safe. But no insurance company would accept a poor driving record as evidence that a driver is a good risk.

Meanwhile, continued HF-related incidents provided motivation to the effort to eliminate HF. Following are summaries a few HF/MHF releases that have been publicly revealed. Politicians, home owners, and business take note: based on the community's response in 1987, the next time a significant HF release occurs anywhere in the world (and it will), demands to eliminate MHF will increase and buyers will avoid businesses and homes in the area of the refineries. Although eliminating MHF will cause temporary inconvenience, a MHF release would create far worse and long-term difficulties.

1990-01-13 Powerine Oil Co., Santa Fe Springs, CA.²³ HF release. Six employees were treated at a hospital for HF burns and possible vapor inhalation and released. Two other employees received respiratory treatment for HF exposure and were kept for observation in the hospital, one for 24 hours and the other for 48 hours.²⁴ The incident occurred when a *corroded pipe holding the acid ruptured*, creating a vapor cloud that employees diluted with water and stopped from drifting outside the refinery, according to oil company officials.

1990-06-11 Torrance Mobil Refinery Alkylation Unit leaks HF vapors.²⁵ **3 workers hospitalized.** An automatic sensor system designed to detect HF spills was *inactive* when a cloud containing hydrogen fluoride escaped accidentally.²⁶ A supervisor who saw the 10-foot-diameter cloud did not trip an alarm because he thought the vapors were headed for an area where no workers were present, a Cal-OSHA report said. The toxic cloud sent three workers to the hospital. *"I saw a big cloud, like a cloud you see in the sky..." said Delome. He held his breath, he said, as long as he could, but his first breath "cut the wind off to my lungs...I was just gasping. I started puking right away."*²⁷ The workers complained of shortness of breath, nausea, chest pains, eye and throat

irritation, and burning sensations in the respiratory tract, and required hospitalization for 2-3 days. *Mobil spokesman Jim Carbonetti at first disputed that any hydrofluoric acid had been released.* Top city officials did not learn of the accident until early Wednesday. Torrance Fire Department (TFD) Chief R. Scott Adams did not find out about the accident until 30 hours after it happened. Mobil did not notify the air quality agency about the release. Carbonetti said the apparent cause of the release was the failure of a half-inch fitting used during the purge of residual vapors from the alkylation unit.

1992-07-15 Torrance Mobil Refinery Thermowell Breach.²⁸ *32 lb. of HF* were released in a mechanical failure. No acid wafted off-site, Mobil and city officials say.²⁹

1994-10-19 Torrance Mobil Refinery Coalescer Inlet Piping Hydrocarbon Release and Fire.³⁰ The explosion and fire injured 28 workers and were the most serious at Mobil in 7 years. It occurred when flammable gases spewed from a pipeline that had been left disconnected.³¹ The explosion occurred only *50 feet from the HF unit.*³² Cal/OSHA reassigned its primary criminal investigator in January 1995 after he was quoted in a local newspaper story *expressing concern about the potential for an HF release* in the explosion. Mobil had complained to the agency. Cal/OSHA reassigns investigators if employers question their conduct.³³

1999-04-02: Release of 288 – 300 lb. HF, not MHF.^{34, 35} Three workers required hospital treatment after a broken pipeline spilled isobutane and *288-300 lb. of hydrofluoric acid* from the alkylation unit, shutting down Crenshaw Boulevard for more than two hours. [Note: the TRI report says that in 1999, 620 lb. of MHF/HF were released.] Nearby schools were ordered to shelter in place. One of the injured workers, Don McDaniels, told TRAA that the release was actually 1,200 lb. HF and that Mobil/ExxonMobil has over the years shut off the additive pump *completely*.

2009-07-19 CITGO Refinery, Corpus Christi, TX. 42,000 lbs.³⁶ Explosion and fire released 42,000 pounds of HF acid, *at least 4200 lb. of which* exited the refinery despite emergency measures. Water suppression systems were used to knock down up to 90% of the HF cloud.³⁷ The system ran out of water and workers rigged a system to use nearby ocean water. The original cause was the unthreading of a single internal plug from a valve stem. This led to valve closure, violent shaking in the piping, and the breakage of connections. Hydrocarbons were released and ignited, leading to explosions and a fire that released HF. One employee was treated for HF exposure. Community injuries and fatalities were averted because prevailing winds carried the acid cloud over the water instead of over inhabited areas.

2015-02-18 Torrance ExxonMobil Electrostatic precipitator (ESP) exploded³⁸ as contract workers were doing maintenance on the nearby fluid catalytic cracking unit (FCC). This event was a *near miss for MHF*, because an 80,000 lb. piece of equipment was blasted out by the explosion, landing about three feet from one of two acid settler tanks containing 50,000 lb. MHF. If it had hit, there could have been a catastrophic release.³⁹

2015-09-06 Torrance ExxonMobil MHF leak during transfer of MHF from truck to refinery vessel. Release rate “10 drops per minute” for hours. According to the Torrance Fire Department presentation at the Torrance Community Workshop October 13, 2015,⁴⁰ this is one of 22 similar incidents involving MHF/HF that have occurred since 2010, virtually without public notice. This incident became public knowledge because of the controversy stirred up by the February 18 incident.

II. EVENTS SET OFF BY THE 1987 MARATHON AND TORRANCE MOBIL REFINERY HF RELEASES

- **1987-12** The Torrance City Council asked staff to study whether the refinery was being operated safely.⁴¹ In March 1988, Councilman George Nakano asked the city staff to assess the risk of hydrofluoric acid versus sulfuric acid. But after receiving two lengthy staff reports in March 1988, council members decided that the city lacked the expertise to answer the question, and began to look for a consultant to do a **Safety Study**. Under authority provided by a new state law

on toxic substances, the Torrance Fire Department had asked Mobil early in 1988 to conduct a risk assessment of HF. But that study wouldn't be completed until March 1989 at the earliest, which was unacceptable to the city. On the last day of May, the council voted unanimously to hire an outside expert and approved the consulting firm's proposal for an in-depth examination of the refinery. The consulting contract with consulting firm Gage-Babcock and Associates was signed July 21, 1988. The safety study, originally supposed to be finished before Sept. 1, was to begin Aug. 1 and completed before mid-October. The \$88,000 consulting contract had "bogged down" in the city attorney's office and the city's environmental division. The city asked for a complete examination of the refinery's design and equipment, Mobil's safety and training procedures, its emergency response plans, and use, handling and storage of acutely hazardous chemicals. The study was to include recommendations on ways to improve the safety of refinery operations under normal conditions and adverse conditions, such as strikes, earthquakes and power outages. Mobil has agreed to reimburse the city for the cost of the study. The study by Gage-Babcock & Associates and the Mittelhauser Corp. was actually released January 1, 1989.⁴²

- 1988-08** By August, the city realized the Safety Study would not "answer their key question: 'What is the risk of the plant continuing to use hydrofluoric acid...?' ... 'That was the most important aspect of the whole study--hydrofluoric acid and the use of it,' Councilman George Nakano said."⁴³ The city subsequently identified Technica Inc., as the right firm to help prepare a risk-management prevention plan for the city of Torrance, again at Mobil's expense.⁴⁴ Technica concluded that Mobil's alkylation unit, where hydrofluoric acid (HF) is stored and used, was "almost three times as likely as the average unit to have a major catastrophe... Some of the key problem areas noted were: nonexistent, incomplete or conflicting written procedures; severe under manning of the unit requiring qualified operators to work a 67-hour week, including 18-hour shifts; poor control room design, including inadequate labeling, ineffective alarms and out-of-date process schematics; operators receiving no training to handle emergencies or abnormal operating conditions; and indications in the log book that leaks of one sort or another are a recurrent problem." Water spray monitors, installed to check the spread of hydrogen fluoride fumes created by an acid release, are "designed to still allow 20% of the hydrofluoric acid to form a poisonous cloud." [SH: Even the ideally effective system allows 10% of airborne HF to escape.⁴⁵] The HF evacuation system installed by Mobil in 1990 to remove the refinery's 29,000 gallons of hydrofluoric acid to an underground tank in the event of an explosion was also a problem. Because the tank is only 100 feet from Crenshaw Boulevard, "if it or its pipes rupture, a catastrophic release is almost guaranteed." The results of this study contributed to the later decision to file a lawsuit against Mobil in 1989. City officials have not made this report public.
- 1988-02-04** The AQMD Task force⁴⁶ on HF was established.⁴⁷ The first meeting was the week of March 20, 1988.⁴⁸ All 18 voting members of the task force represent public agencies, with representatives of industry, unions, and community groups serving as non-voting members on the 45-member group.⁴⁹ Warnings from Fred Millar of the Environmental Policy Institute in Washington about hydrofluoric acid leaks had helped prompt the AQMD to set up the task force. Facilities in Los Angeles County that used or stored hydrofluoric acid in significant quantities at that time were the Mobil Refinery in Torrance, Allied Corp. in El Segundo; Union Pacific Resource refinery (later Ultramar, now Valero), Wilmington; Jones Co., South Los Angeles; Powerine Co., Santa Fe Springs, and the Golden West Refining Co. refinery, Santa Fe Springs.⁵⁰ The Task Force's controversial January 24, 1990 report gave recommendation to permit continued bulk use of HF with improved safety measures. In March 1990 the Task Force gave a report to the AQMD board offering three options but making no recommendation. In addition to the original recommendation, the other two options were to permit continued use without requiring improved safety measures and to ban the bulk use of hydrofluoric acid.⁵¹
- 1988** Torrance ordered Mobil to deliver a risk-management prevention plan to the city's Fire Department, to address the findings of the Technica study.⁵² Mobil's own documents proved that due to the age of the Torrance refinery, its process units were highly congested and *did not meet*

Mobil's minimum fire and safety standards for separation between the units. Even Mobil's insurers warned the company of "*a domino-type catastrophe* should even one unit become involved in a major fire." The heat of a fire can cause MHF to build up pressure and burst pipes and vessels. Refinery fires can lead to explosions, breaking pipes and puncturing vessels full of MHF.

- **1988-03-21** Mobil hired consultant Dames & Moore to prepare the seismic portion of the risk-management prevention plan. That consultant's work "was tightly monitored by Mobil and its reports were highly edited by both Mobil management and its attorneys," the city reported in an October 1990 brief. Nevertheless, the consultant's reports noted that at least six different faults are close enough to the refinery to generate a significant quake, the brief said the risk of a "*potential catastrophe at the Torrance refinery arising from a significant earthquake on any of the faults in the Los Angeles Basin is extreme.*"

On Oct. 11, 1987, a quake registering about 3.2 on the Richter scale caused liquefaction of the soil beneath a concrete-lined canal in one refinery unit, cracking it. On Nov. 19, 1988, a 4.5 quake broke a pipeline in the refinery's nitrogen plant, releasing a large cloud of the chemical. These were clear signs that a MHF/HF release could result from a moderate or severe earthquake.

City officials rejected Mobil's initial risk-management prevention plan and worked until April of 1991 with Mobil to create a new one. The 1991 plan called for a number of improvements to the alkylation unit.

- **1989** Torrance Councilman Dan Walker proposed an initiative, Measure A,⁵³ to limit to 250 gallons the amount of hydrofluoric acid that could have been stored anywhere in Torrance. Walker spent \$60,000 on mailer petitions; 13,000 signatures were returned in favor of the initiative.⁵⁴ If approved by voters on March 6, 1990, the measure would effectively ban the chemical at the Mobil Refinery. Mayor Katy Geissert and the other six council members were on the side of Mobil against the measure, even though the Mayor and city councilmen Bill Applegate, Tim Mock, and Dee Hardison claimed to favor banning the bulk use of hydrofluoric acid.⁵⁵ George Nakano said he favors a ban on hydrofluoric acid or stricter controls. Mark Wirth said he opposes a ban "now" but might change his mind if the AQMD comes out in favor of one.⁵⁶
- **1989-04-07**⁵⁷ City of Torrance brought a public-nuisance lawsuit against Mobil, asking the Superior Court to declare the refinery a public nuisance and let the city regulate it.⁵⁸ In the words of the lawsuit, Mobil, the sixth largest U.S. corporation, is "callous and indifferent" to safety. They pointed out that even lesser accidents could reach beyond the refinery's fence to affect the lives and health of residents and passers-by.⁵⁹ The suit "cited numerous instances of worker injury and death at the refinery as well as an instance in which fumes from the plant hospitalized eight students and two teachers at a nearby school."⁶⁰ A confidentiality agreement provided that all material shared in the landmark case would be kept secret. According to one resident, "Members of the Torrance City Council ... made a serious strategic error in relying exclusively upon that great vestige of the 19th-Century industrial revolution, the public-nuisance lawsuit, to the exclusion of the political process."⁶¹ Walker asserts they would not have filed the lawsuit without being goaded by his initiative and the 13,000 signatures he collected.⁶²
- **1989** The City Council fights Walker's Measure A with Measure B that would allow the city to raise taxes to pay for legal costs if the HF ban succeeds.⁶³ The council members argue that Mobil would prolong the city's lawsuit if the hydrofluoric ban passed, forcing the city to spend *millions of dollars in legal fees*.
- **1989-08-31** Torrance Councilman Timothy Mock proposes an ordinance to allow the city's Chemical Review Board to control use of acutely hazardous materials⁶⁴ as an alternative to Measure A. The board would "issue permits to companies that use acutely hazardous chemicals. The board could deny a permit or require changes in how a company handles a chemical. ...The

effort is believed to be one of the first of its kind in the nation by a municipality." "The Chemical Review Board had met three times since it was formed in the late 1960s. Its decisions can be appealed to the City Council. The board includes a chemical engineer and members of the Fire and the Building and Safety departments. ...[the] proposal would also allow the board to require some companies to prepare a report that assesses the risk of using and storing acutely hazardous chemicals. ...During the council meeting, Mayor Katy Geissert expressed concern that the permit applications ... would overburden the board and the City Council... Councilwoman Dee Hardison said the proposal should also regulate the transportation of acutely hazardous chemicals. Councilman Bill Applegate asked that the staff find out if the state Legislature is considering or has considered similar laws."⁶⁵ [SH: also see entries for 1991-06-04 and 1993-05-07.]

- **1990-01-01** The City of Torrance Refinery Safety Study by Gage-Babcock & Associates and the Mittelhauser Corp. was released, raising a host of issues including a charge that management is lax in enforcing safety regulations.⁶⁶ In the dispute about safety and discipline, the issue of hydrofluoric acid, discussed in a section on acutely hazardous chemicals, "faded into the background." The report offered no clear-cut answer on HF. The consultants said their study was hampered because Mobil chose to unveil the acid rapid de-inventory system just 4 days before the report was released. Regarding active mitigation measures, the report noted, "Fixed water-spray protection has questionable reliability in operations that have an explosion potential," the report said. "An explosion can readily disable the system as a result of broken piping, for instance."
- **1990-01** Polling indicates that the public strongly favors Measure A banning HF.⁶⁷
- **1990-02-17** In identical letters to their Torrance neighbors, refinery employees John Berryhill and Paul Pepper attacked Measure A, calling it a "grab for publicity by an ambitious politician who wants to take advantage of people's fears."⁶⁸ Mobil's campaign committee was the sponsor.
- **1990-03-06** Walker Initiative Measure A loses vote. The council's counter proposal, Measure B, also was defeated. Opposed by Mobil, Torrance Mayor Katy Geissert, and the Torrance City Council, it was voted down 3-1, "a drubbing for which the Torrance City Council took credit."⁶⁹ Mayor Katy Geissert said. "I feel particular responsibility because people who talked to me, many people, said they were thinking of voting for the measure because (they said), 'We are scared.' . . . *They trusted me and voted no.*"⁷⁰ Voters interviewed as they left the polls said it was the City Council's warnings that Measure A could hamper other efforts to control Mobil that won their votes against the acid ban. "The statements the mayor made were effective." said Donald Betsworth, 60, a retired Los Angeles City Fire Department captain.

Mobil spent \$2 million^{71,72} to defeat Measure A, on mailers, radio ads, cable television programs, a VHS recording delivered to the door of every Torrance resident, as well as hiring out-of-state phone banks to poll and persuade local residents. This spending dwarfs the previous Torrance record of \$46,000 and far outstrips spending by the measure's backers, who collected ~\$25,000,⁷³ along with the \$60,000 spent by Dan Walker.

But Councilman Tim Mock said Mobil officials told him that they "could not have done it without the City Council's opposition to the measure." Mobil claims they were handed a clear victory at the polls that they believe will hamper further attempts to ban use of hydrofluoric acid in Torrance and elsewhere.⁷⁴ "I think it is quite clear that the people of Torrance don't perceive (the refinery's use of hydrofluoric acid) as the big problem people like Dan Walker want to make it," refinery manager Wyman Robb said. Del Persinger, a senior refining associate with the American Petroleum Institute, said the Torrance vote "sends the right signal to the country."

City officials who opposed the initiative, however, claim the results give them a mandate to pursue other ways to get the acid out of Torrance. [SH: This defeat doesn't reflect community

support for HF use. To this day most long-time Torrance residents think that HF was eliminated decades ago and are shocked to hear it is still there.]

- **1990-?-?** Assemblyman Curtis Tucker Jr. (D-Inglewood) proposed a bill to force oil refiners and other businesses to switch from HF to safer substitutes, relocate to unpopulated areas or shut down operations.⁷⁵ Tucker acknowledged that Torrance's rejection of the [Walker] initiative likely would be used by some lawmakers to fight his bill. Rep. Mel Levine (D-Santa Monica) also said he may introduce federal legislation to control use of the chemical.⁷⁶
- **1990-03-20** The Torrance City Council, which campaigned vigorously against Measure A, voted unanimously to support similar bans by air quality officials and by Assemblyman Curtis Tucker, Jr.⁷⁷ The Torrance council action reflects the continued effort by six council members *to distance themselves from the successful Mobil campaign that defeated the ban.*
- **1990-04-04** Tucker bill shelved.⁷⁸ Democrats on the Assembly Environmental Safety and Toxics Committee persuaded Assemblyman Curtis Tucker, Jr. to send his bill banning HF to "interim study" to prevent the bill from being heard again this year. Tucker said he will introduce a scaled-down proposal next year. Although opponents of the bill acknowledged the risk from HF, they claimed the bill was "misguided in pushing for such a sweeping proposal that singled out one chemical for a phase-out." "Assemblywoman Sally Tanner (D-Baldwin Park), chair of the committee, said she would like her committee to examine the safety of hydrogen fluoride, the amount used in the state and ways to prevent a disaster. However, she said, 'to ban (HF) without further study is something we couldn't very well do.'"
- **1990-04-06** The South Coast Air Quality Management District (SCAQMD) passes "Rule 1410" to ban HF.^{79, 80, 81} The agency allowed that if research into alternative forms of hydrofluoric acid was not satisfactory by Jan. 1, 1994, the four affected refineries would phase out HF and convert to sulfuric acid (H₂SO₄). HF acid must be gone from Allied Signal's refrigerant manufacturing plant in El Segundo by 1993 and at the oil refineries by 1995.
- **1990-10-02** The City of Torrance submits a 70-page brief to the court to resolve the public nuisance lawsuit without a trial.⁸² Based on more than 70,000 pages of Mobil documents turned over to the city, the 1988 Technica Inc report, and the Dames & Moore seismic portion of the 1988 risk-management prevention plan, the brief asserts that Mobil managers repeatedly placed profit ahead of safety at the refinery, took a "Band-Aid approach" to repairs, thwarted safety surveys, *tried to downplay the dangers posed by the refinery's use of hydrofluoric acid* and used unqualified contractors for dangerous jobs. It said the refinery could be hit by earthquakes from any of several nearby faults, toppling tanks filled with hazardous chemicals and setting up a catastrophic chain-reaction explosion. The brief noted that the Nov. 19, 1988, quake that releasing a large cloud of nitrogen gas "drives home the threat posed if a major earthquake should sever a pipeline containing highly toxic hydrofluoric acid or highly explosive gases such as propane or butane." Additionally, the city stated that a strong quake could knock out much of Mobil's water supply for fighting fire and suppressing HF and could cut off the electricity needed to control the process units.

A draft brief, acquired by the LA Times, revealed that Mobil documents admitted that the Torrance refinery, one of the company's oldest facilities, had Mobil's worst overall safety record for several years. Then-refinery manager Wyman Robb called the Torrance facility "a bit of a bootstrap operation." Repair and replacement projects at the refinery had been delayed, ignored, or reduced in scope or funding years after refinery employees first noted the problem. "One employee characterized Mobil's attitude toward preventive maintenance as 'run it until it breaks.'"⁸³ *Recent reports show that this attitude still prevails in California refineries.*^{84, 85}

- **1990-10-09** The nuisance lawsuit is terminated with a court-approved **Consent Decree**⁸⁶ three weeks before the trial scheduled for November 5.⁸⁷ Mobil “agreed to pay for an impartial safety advisor to monitor the refinery and report unsafe conditions to a hired judge through 1997.” The decree will be supervised by ex-FBI special agent and retired Superior Court Judge Harry V. Peetris.⁸⁸ Peetris serves as the final authority in the decree's implementation and had the responsibility to decide “all disputed enforcement matters” between the city and Mobil.⁸⁹ Peetris had a bachelor's degree in accounting and legal experience in personal injury, business law, traffic court, and mental health court.^{90,91}

Section Four of the consent decree permits Mobil “to commit to a modified HF catalyst by December 31, 1994 only if it is demonstrated *to the satisfaction of the safety advisor* that the catalyst as modified *would not form an aerosol or dense vapor cloud upon release.*” If they cannot meet this requirement, Mobil must stop the use of HF.⁹² The alternative technology was not named but assumed to be sulfuric acid. Torrance agreed to allow Mobil to use hydrofluoric acid until the end of 1997. According to Dan Walker, it was never the city's intent to force Mobil to eliminate HF. Increased safety measures and MHF were the goals of the consent decree from the beginning.⁹³

There were a maze of secrecy agreements between Mobil and the city.⁹⁴ “By avoiding a public trial, Mobil... joined the ranks of an increasing number of American corporations that have concealed the details of public hazard cases by negotiating pretrial settlements.... By avoiding trial, Mobil may be able to prevent the public from seeing thousands of detailed documents and hearing testimony about safety issues involving the refinery that would have become a matter of public record in a courtroom.”⁹⁵ According to one citizen, “Torrance firefighters were prepared to testify under oath [at the trial] that when they responded to [the November 24, 1987] explosion at the refinery, a Mobil supervisor implored them to cool down the hydrofluoric acid alkylation unit, because the unit was within three minutes of exploding and killing everyone within three miles.”⁹⁶

The LA Times and Copley Press submitted a request February 1991 to Judge Peetris to review the material Mobil gave the city during 18 months of trial prep. As of September 12, 1991 he hadn't replied. While questioning Trial Lawyers for Public Justice, which sought the same documents on behalf of Friends of the Earth, the California Public Interest Research Group, Environmental Action Foundation and Torrance residents Terry Reid and William J. Christenson, Peetris declared that opening cases of public interest to review could create havoc, like releasing “a tiger in a cage of baby chickens.”⁹⁷ Mobil argued that the Safety Advisor would protect the public interest, based on impartiality and expertise.

- **1991-05-30** Judge Peetris selects Westinghouse Electric Corp., to be Safety Adviser (SA), giving Mobil the SA it had requested.⁹⁸ Westinghouse also holds other contracts with Mobil for services and supplies. Steve Maher will be the project manager for Westinghouse.⁹⁹ On June 27, 1991,¹⁰⁰ Peetris also set a \$1 million spending limit for the entire program, over vehement objections from the city.¹⁰¹ Torrance officials, who have spent \$1.4 million on the lawsuit, expressed disappointment. They had lobbied in favor of the nonprofit research firm SRI International of Menlo Park, which had estimated the project's first stage alone would cost Mobil up to \$1 million. Westinghouse had estimated that the entire job would cost about \$350,000. City Councilman Dan Walker compared Westinghouse's role as safety adviser protecting the public interest to “a fox watching the chicken coop.”¹⁰² Torrance pointed out that to properly evaluate MHF, “such an unproven and potentially innovative technology, far more will be required than [Westinghouse's planned] cursory review of a few Mobil documents and the drafting of two \$7,500 reports to the Court.”¹⁰³ [SH: and that is exactly what the SA did.] Torrance responded to the choice of Westinghouse by naming TFD Chief R. Scott Adams, the city's “liaison for implementation of the Mobil Oil refinery Consent Decree,” to act as a check on “impartial” Safety Advisor Steve Maher.¹⁰⁴

- **1991-06-04** Torrance funds study for Chemical Review Board ordinance to control toxic materials¹⁰⁵ (the ordinance proposed by City Councilman Timothy Mock in 1989). The city council agrees to pay the Battelle Memorial Institute \$140,000 to study how the city board should measure the risk of materials. "City Councilman Timothy Mock said the proposed ordinance could take on new importance in light of [the choice of] Westinghouse Electric Corp... as safety adviser... The choice has undermined some city officials' confidence that the safety adviser will require Mobil to stop using HF... Councilman George Nakano said he plans to ask the city staff to analyze what power the ordinance would have if Westinghouse does not enforce the phase-out of the acid. ...Assistant City Atty. Ronald Pohl said it is too early to tell how the proposed ordinance could affect the use of HF." "There can be a benefit to allowing companies to use this material, if it's used safely," said Whitehead, who is chairman of a special committee studying the ordinance for the Torrance Area Chamber of Commerce.¹⁰⁶ [Also see entries 1989-08-31 and 1993-05-07]
- **1991-10-23** Torrance files a 31-page petition with Judge Peetris asking him to conduct a Nov. 1 hearing to extend oversight^{107,108} until 1998 (instead of 1997) on grounds that Westinghouse was dragging its feet. Westinghouse missed an Oct. 1 deadline to submit a detailed outline of how it will conduct a safety audit at the refinery, has "done practically nothing to carry out its substantive duties," has insisted on unnecessary work contracts, has failed to open a Torrance office for the project and has sent employees onto the Mobil refinery site only three times in the last five months. Mayor Geissert, who had assured everyone the City of Torrance would look "very closely over the shoulder of Westinghouse," now proclaimed, *"We feel that the public has been misled and we have been misled. . . . The enforcement has been flawed."*¹⁰⁹ The city's efforts to maintain contact with Mobil and Westinghouse did not work, and they had no influence on the SA. Yet the city is unsuspicious of and apologetic to Mobil: "I don't blame (Mobil)," said Ralph Nutter, a city attorney. Westinghouse is "looking at this as a private contract with Mobil."¹¹⁰
- **1993-03** Westinghouse SA project manager Maher leaves Westinghouse for EQE Engineering International, a subcontractor on the Mobil project.¹¹¹ The reason for his departure is unavailable.
- **1993-05-07** Torrance abandons ordinance for Chemical Review Board to control toxic materials.¹¹² The council voted to stop work on the program, saying that stricter state and federal regulations have made the Torrance program unnecessary and the cost is too high. Torrance owed \$54,700 to Battelle Memorial Institute to complete the work. Mayor Katy Geissert also said the council was concerned about imposing another layer of permit regulations on recession-weary local businesses. Geissert said the city already has taken action (the Consent Decree) to regulate HF. But former Councilman Mock said the chemical regulation program would have allowed the city to halt the use of hydrofluoric acid directly. While recent changes in state and federal regulations are an improvement, they still do not prevent companies from using dangerous chemicals. "The companies still decide," Mock said. Geissert, however, said the council could revive the chemical regulatory effort later.
- **1993-07-30** SCAQMD Rule 1410 is thrown out on a technicality.¹¹³ Ultramar (now Valero) Refinery's primary contention was that AQMD does not possess the necessary police powers to phase out preemptively the use of HF. That argument was rejected; the court found that *AQMD is empowered to adopt regulations designed to prevent air pollution episodes*, by banning HF, for example. But Ultramar also alleged that AQMD failed to comply with the 30-day review period for Act 1410 because 12 pages of the 288-page draft Environmental Assessment (EA) were omitted. AQMD had offered more time for review after the error was discovered, but Ultramar was not required to accept this offer, and so didn't. The court sided with Ultramar on this point.
- **1994-03-15** The City of Torrance and Mobil appeared before the Superior Court (or Judge Peetris?) to advise that the fees and expenses of the SA had exceeded court appointed limits.

- **1994-09-30** The Consent Decree Stipulation and Order.¹¹⁴ The 1990 Consent Decree stated that Mobil could continue using HF only if they could develop a modified form by December 31, 1994 that “*would not form an aerosol or dense vapor cloud upon release.*” Otherwise, *Mobil must stop using HF and switch to sulfuric acid.* But after unknown millions of dollars and years of effort, MHF ***failed to meet that condition.*** At the start of the Consent Decree in 1990 Mobil pledged to use a relatively nonvolatile MHF composition of 50% additive and 50% HF. But after four years of pretense, Mobil finally admitted that level of additive would significantly interfere with alkylation and was therefore not viable. Their new plan was to use 30% additive, a level at which MHF *will* form a dense vapor cloud upon release. Compared to HF, *Mobil claimed*, 65% less acid would become airborne.^{115, 116} That means 35% of released MHF will form a dense cloud of pure HF. This is not the ban on HF the public demanded and Mobil promised to deliver in 1990. It was time for the city to demand that Mobil switch to sulfuric acid.

Experience with the 1993 MHF demo plant¹¹⁷ doubtless taught Mobil that MHF with 50% additive is safe but not usable in an alkylation unit. Mobil kept this quiet, developed a plan to use MHF at lower and deadlier additive concentrations and crafted a Quantitative Risk Analysis (QRA) to justify it. The Safety Advisor’s closest city ally, Chief R. Scott Adams, introduced the idea to the city. As a January 31, 1995 Torrance City Council meeting report explained, Chief Adams “supported language that would allow a comparison of the two processes [HF and H₂SO₄] so that the lowest risk of the two commercially available technologies could be obtained for the community.”¹¹⁸ “It was the city--not Mobil--that initially suggested reopening the [Consent Decree] language governing hydrofluoric acid,” Michael Leslie, an attorney for the city, said.¹¹⁹

This is how, barely 3 months before the December 31, 1994 deadline for a decision on MHF, the City of Torrance, Mobil, and Judge Peetris rescued MHF by changing the Consent Decree.¹²⁰ Mobil could use MHF if they demonstrated that it “(*including mitigation*) presents no greater risk than a sulfuric acid alkylation plant producing a comparable amount of alkylate.”¹²¹ “The city and Mobil say that a comparison of the two acids will yield valuable information about which is safer.”¹²² The Torrance City Council agreed to the Stipulation and Order changes behind closed doors. Note that the development of MHF was in response to recognized weaknesses of mitigation measures like water suppression. MHF was meant to replace these inadequate measures, not to rely on them. The 1994 Stipulation brought us full circle, from a “safe form of HF,” back to a dangerous form of HF that relied on unreliable mitigation measures to keep people safe.

This change put community safety at the mercy of Mobil’s nuanced and unverified proprietary claims for MHF. It was no longer necessary to prove MHF safe, just to claim that sulfuric acid was dangerous. Mobil accomplished this by producing a Quantitative Risk Analysis (QRA) report, obviously under production from some time. QRA’s are inaccurate and subject to manipulation because of the myriad assumptions, multiplicity of methods to chose from, and poor data quality used. As the Safety Advisor later explained, “the QRA proved to be a means of defusing disagreements between various stakeholders while preserving Mobil’s ability to use HF alkylation.”¹²³ Mobil’s QRA enhanced the benefits of MHF and fabricated new dangers for sulfuric acid. The possibility of an accidental MHF release was minimized, and was not “weighted” to account for the high consequence of a significant MHF release: mass casualties.

The Stipulation and Order also removed the first safety advisor, Westinghouse, and made EQE Engineering the new SA.¹²⁴ Westinghouse originally bid \$350,000 for the entire job but had spent \$1.35M. Officially, Westinghouse asked “to be relieved of its duties” and the Stipulation and Order gives them credit for having “faithfully carried out” the SA tasks.¹²⁵ The SA budget for the rest of the Consent Decree was set at \$360,000, beyond which the city of Torrance would be required to pay. Steve Maher, who was the SA project manager at Westinghouse before taking a new job at EQE, continued as the EQE SA project manager.¹²⁶

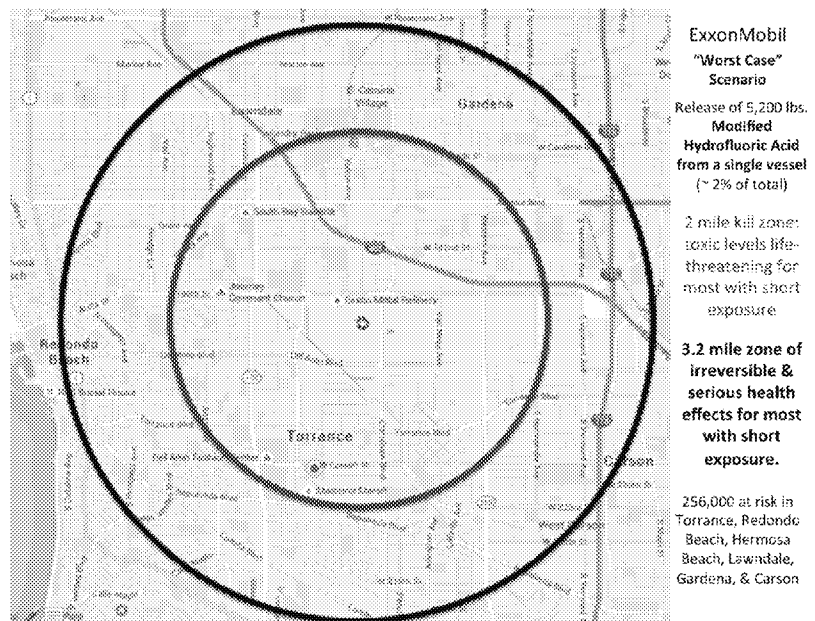
The city had even more reason in 1994 to lament the Consent Decree, but they had spent \$1.6 million on legal fees and time was running out to show results. An Oct 19, 1994 explosion and fire at the Mobil refinery injured 28 workers and was a near miss on the HF alkylation unit. According to Cal/OSHA investigators, it was caused by Mobil's "willful" failure to properly inspect refinery equipment.¹²⁷ Despite this, "Torrance officials [said in November 1994] they have full confidence in the monitoring project and believe it already has created a safer refinery." Said Torrance City Atty. John Fellows, "I think we'll all stand back and be very proud of [the consent decree]."¹²⁸

1995-01-03 The Safety Advisor issued a decision that Mobil should be allowed to implement MHF.¹²⁹ Based on a hasty three-month review of Mobil's detailed and complex QRA, he accepted the dubious claim that sulfuric acid poses an airborne toxic danger to the community and recommended trusting Mobil's revised MHF claims. The Safety Advisor's report was appreciative and forgiving of shortcomings. As a Torrance City Council report that month explained with satisfaction, "the Safety Advisor concludes that the remaining 'denseness' [of MHF clouds] is not a significant contributor to off-site risk."¹³⁰ This scenario map (R) reflects ExxonMobil's current EPA RMP offsite consequence analysis report for MHF. Even this low-ball assessment shows that MHF vapor density is a very significant contributor to off-site risk. Sulfuric acid alkylation units, on the other hand, are not even required to file a toxic offsite consequence analysis, since sulfuric acid is a liquid and doesn't form dense toxic clouds.

Steve Maher established a firm some time during 1995 to capitalize on his visibility as Safety Advisor.¹³¹ That firm, Risk Management Professionals, was hired by Big West Refinery in 2008 to sell Bakersfield on MHF, using an identical claim about the dangers of sulfuric acid alkylation.¹³² At the October 13, 2015 Torrance Community Workshop, Mayer was promoting the same old story about MHF being safer than sulfuric acid, an opinion shared primarily if not exclusively by MHF advocates.

The city held a public information meeting on January 18, 1995 where Mobil and the Safety Advisor treated the audience to presentations on their plan to replace deadly HF with a somewhat less deadly form of HF.¹³³ The Q&A session didn't go well, according to Chief Adam's report. "Risk communication" is hard and the experts forgot to use "quotidian" terms that John Q. Public could grasp. "The public's desire, yet inability to comprehend, technical answers created frustration and unnecessary... suspicion of the safety advisor's evaluation, and the credibility of Mobil's representatives." But time has revealed that the residents' suspicion was justified and Chief Adams' complacency reckless and uninformed.

By January 31, Chief Adams, the city's "liaison for implementation of the Mobil Oil refinery Consent Decree," had concluded the Safety Advisor's recommendations are "sound and valid."¹³⁴ The new technology "represents a significant reduction in risk to both on-site and off-site populations," Adams wrote in a report to the council.¹³⁵ Adams' endorsement and advice to embrace MHF meant giving up the last remaining opportunity to



eliminate HF from the refinery for decades to come. Mobil crowed on Feb. 7, "With the submission of Chief Adams' report ... there can be no question as to whether Mobil has met the standards established under the Consent Decree and by which we have preserved the option to continued use of the modified HF catalyst. All parties to the consent decree agree to this—Mobil, the independent safety advisor..., and the city's designated representative...[acting] as a check against the conclusions of the independent safety advisor."¹³⁶ Mobil had enlisted all in support of their use of MHF. But the opposition of residents had given City Council members second thoughts and at a meeting 1/31/1995, several requested Consent Decree changes or actions by Mobil. Many requests, ironically, were for greater oversight by the Safety Advisor and TFD.¹³⁷ Mobil responded that the City Council "is driven not by sound conclusions founded on good science, but because of innuendo and perception created by the irresponsible dissemination of inaccurate information by third parties who presume they have no accountability for their actions."¹³⁸ The city had until February 16, 1995 to object to the Safety Advisor's report, otherwise Mobil could switch to MHF without further review, said Michael Leslie, an attorney for the city.¹³⁹

- **1995-02-14** The Torrance City Council chose volatile MHF over the far safer alternative, sulfuric acid.¹⁴⁰ TFD Chief Adams "continues to recommend that the city concur in the safety advisor's evaluation and recommendations."¹⁴¹ But many in the city were angry. "The Mobil pact has effectively taken the HF decision out of citizens' hands," a concerned citizen noted.¹⁴² So the city, "urged on by residents and businesses that are worried about safety," asks the court for 11 conditions and (with unintended irony) increased oversight *by the safety advisor* of Mobil's conversion.¹⁴³ If Mobil does not agree to the guidelines, the city will ask for a hearing before Judge Peetris. Three council members opposed the city request as too weak to guarantee community safety. Councilman Dan Walker "called Mobil's proposed technology untested and questioned if it would work--or if, in the end, the refinery would even implement it." Walker and Councilman Don Lee wanted to add a clause that "if a technical problem prevents Mobil from switching to MHF, Mobil agrees to switch to using sulfuric acid." They were prophetic in these observations. Chief Adams, on the other hand, "further recommends that the council commend Mr. Steve Maher, the project manager for the court's safety advisor, EQE international, and Dr. Geoffrey Kaiser of SAIC for their thoughtful, thorough, and dispassionate evaluation of Mobil's modified HF technology." Subsequently, the city *allowed the safety advisor to alter* the 11 conditions it requested. The Judge accepted the altered conditions in April 1995.¹⁴⁴ Judge Peetris commended Mobil at the court hearing for the safe refinery it has created. But Councilman Dan Walker was dubious. "When Dec. 31, 1997, arrives, will Mobil have done what it said it was going to do...?" Again, Walker was prophetic.
- **1995-05** The Torrance Mobil Safety Advisor "Final" Report,¹⁴⁵ issued 8 months after Steve Maher's second appointment as SA, concludes, "*Within the context of the uncertainties that exist in the modeling of both MHF and sulfuric acid releases, the consequences of equivalent releases... are approximately the same. ...The specific objectives of the Stipulation and Order will be met with a conversion to... MHF... within the range of uncertainties that inevitably exists in the [QRA].*" (emphasis added)

With this equivocal statement, Steve Maher claimed that MHF and sulfuric acid alkylation have equivalent risk. But experts disagree: "HF is a toxic, volatile gas at [refinery] conditions, while H₂SO₄ is a toxic liquid. Therefore, H₂SO₄ is much easier to contain in the event of an accidental release... Tests conducted in 1991 by Quest Consultants, Inc. showed that... a sulfuric acid aerosol formation [toxic moving cloud] will not occur."¹⁴⁶ Whereas, Mobil admitted 35% of MHF becomes airborne upon release. This is why it was still dangerous, especially with 250,000 lbs. of it onsite.

- **1995-09** The engineering, design and procurement contract for the MHF Alkylation Unit Project at the refinery is awarded to Jacobs Engineering Group.¹⁴⁷

1997-12-31 According to a contemporary LA Times report, the Torrance-Mobil Consent Decree expired on this date, as per the original 1990 Consent Decree agreement.¹⁴⁸ But, unknown to the public or the press, the Consent Decree didn't expire as scheduled. As soon as the new MHF alkyl unit started operations sometime at the end of 1997, it *immediately failed*. Even at 30% concentration, lowered from 50% in 1994 by the Stipulation & Order,¹⁴⁹ the MHF additive caused "unit operational instabilities ... compromising product quality and preventing unit operation at full production capacity."¹⁵⁰ Mobil presented a plan to cut the problematic MHF additive to 10%, so low as to be merely symbolic, with no meaningful safety advantages over pure HF. MHF's operational failure and the slashing of MHF additive have never been revealed to the public or the press, except in the Safety Advisor's previously unpublicized 1999 report that was acquired by TRAA in 2015.

The secretive 1997-98 changes were out of character for the Consent Decree. As Chief Adams' 1997 report to the Torrance City Council made clear, "two significant [Consent Decree technical] areas included direct involvement and input by the public and the City Council... the evaluation of [MHF] ...and the emergency notification and warning systems."¹⁵¹ In 1994 the public was told about MHF's failure to be safe, which had been promised in 1990. But the public has never been told that in the end, MHF failed even to be "safer" than HF. The City Council may have been left in the dark as well. Fire Chief Adams' report to the City Council meeting December 16, 1997, gave no hint of problems with the MHF unit, stating "Conversion of the Alkylation Unit to the MHF process is complete. Mobil states that the MHF process will be completely on line and operating, on schedule, January 1, 1998." He mentions 26 tasks that would extend beyond 1997. None relate to the alkylation unit.

So the MHF additive was slashed, leaving MHF 90% HF and nearly identical in toxic cloud formation. According to the Goldfish HF Test Director, Dr. Ron Koopman, just 10% less acid will become airborne upon release at that level, compared to pure HF.¹⁵² But Mobil still had to make a show of adhering to safety claims they made for the Consent Decree in 1994. Knowing they could rely on uncritical support from the "impartial" safety advisor Steve Maher and Chief R. S. Adams, the "primary representative for the City in the implementation of the Consent Decree,"¹⁵³ Mobil introduced an "innovative" and dodgy proprietary barrier technology for HF alkylation units.

December 1997: Consent Decree Stipulation and Non-Consent Decree Protocol.¹⁵⁴ Mobil and the City of Torrance quietly and secretly agree to extend the term of the Consent Decree and the court's jurisdiction "to finalize Safety Advisor report and recommendations that had not been completed by December 31, 1997. The stipulation also contained a contractual protocol between Mobil and the city for non-Consent Decree items relating to health and safety issues at the refinery." The Stipulation and Protocol extended the Consent Decree for a period of one year. The author has not been able to get a copy of this stipulation. But City of Torrance documents have been located that appear to be precursors to the Court Documents. A 2000 Consent Decree court document that describes the 1997 Stipulation and Protocol does not mention the MHF failure, reduction in additive concentration, or the addition of barriers to the alkylation unit.

TRAA finally managed to force disclosure of a previously hidden Safety Advisor's report from 1999 that revealed the following events.¹⁵⁵ All data was redacted from the report and is withheld from the public, but sufficient industry data is available online to determine several parameters with a measure of confidence. As of December 19, 2015, the City of Torrance has refused to respond to our request for a public inquiry into the events of 1997-8. Four of the six city councils members at the time, Dan Walker, Don Lee, Marcia Cribbs¹⁵⁶ and George Nakano,¹⁵⁷ say they have no memory of MHF's operational failure or the reduction in additive. City Manager LeRoy Jackson has admitted to knowing about the change, but accepts no responsibility.¹⁵⁸ It is unknown what role Mayor Dee Hardison (1994-2002) played, but after the 2/18/2015 explosion Ms. Hardison came through for ExxonMobil, writing a letter to a Senate hearing committee editor attesting to ExxonMobil's largesse to the Torrance. In March 2016 she abbreviated this letter and

sent it to the Daily Breeze saying that it was “time for the community to return [ExxonMobil’s] favor” by supporting their plan to exceed normal start-up emissions.

- **1998-01** Mobil identified its “desired target additive” concentration, 10%.¹⁵⁹ Because of the Consent Decree, Mobil could not eliminate the additive, so they cut the concentration by a factor of three to minimize interference with processing. The “safety” advantage of 10% MHF over HF is symbolic only. Based on industry data in the MHF European patent, 10% additive will achieve less than a 20% reduction in airborne acid formation.¹⁶⁰ According to the Valero refinery, 10% additive can effect only a 15% reduction.¹⁶¹ According to Dr. Ron Koopman, HF expert and lead engineer on the famous 1986 Goldfish HF release tests, 10-20% additive will achieve only a 10% reduction.¹⁶² MHF is 90% HF and nearly identical to HF in vapor cloud formation. A central question is, when did Mobil and the SA become aware of MHF’s incompatibility with alkylation? In November 1994 the SA and TFD visited the MHF demonstration unit in Paulsboro, NJ,¹⁶³ which operated from July 1993 - June 1994. Unless it was more sandbox than testbed, this unit would have revealed MHF’s problems during alkylation. Based on Mobil’s instant awareness of problems upon start of operations, their immediate production of an “innovative” recovery plan, and a report justifying the changes by February 1998, Mobil and the SA had foreknowledge that MHF would fail.
- **1998-02-01** Mobil “began to provide an updated QRA for the purpose of justifying operation”¹⁶⁴ with only 10% additive. That statement makes it clear: First came the operational plan and then came the effort to “justify” it, that is, to “prove” it safe. In a 1996 paper the SA had gloated over the usefulness of Quantitative Risk Analysis (QRA) reports: “The QRA proved [in 1994] to be a means of defusing disagreements between various stakeholders while preserving Mobil’s ability to use HF alkylation.” Mobil hoped it could work for them again, with the help of the SA, Torrance Fire Chief R. S. Adams, TFD’s hazardous materials administrative officer Battalion Chief Kenneth Hall, and possibly other allies. As the SA tells the tale, Mobil performed an “innovative reconsideration of the balance of additive concentration vs. application of other mitigation features.”¹⁶⁵ That is, Mobil fell back on an old industry strategy, barriers, which typically reduce acid cloud concentration only in the near field, with very little effect at any distance.¹⁶⁶ The Safety Advisor claimed there was a MHF barrier synergy:

Claim 1: Barriers decrease the initial momentum and minimize aeration of the release stream

Claim 2: Low momentum and minimal aeration enhance the additive’s affinity for HF

Claim 3: Therefore, the Airborne Reduction Factor (ARF) achieved by MHF will be significantly improved at the locations of the barriers

Claim 4: Therefore, a 10% MHF alky unit as a whole with such barriers will achieve an ARF even greater than the ARF achieved by a 30% MHF unit without such barriers.

But these claims were no more than PR, meant to preserve the MHF safety myth. Mobil’s new barrier theory has virtually nothing to do with MHF. As the SA admitted on page 85 of his 1999 report, “the ARF at very short barrier distances is only *weakly dependent on the acid [SH: or vapor suppressant additive] concentration*. This is because the HF reduction results primarily from the reduction of flight time of the release jet rather than from vapor pressure suppression.” Whether for MHF or pure HF, Mobil’s untested theory on acid rainout from closely spaced barriers comes to the rescue.¹⁶⁷

Mobil claimed that its barrier technology “more than compensates for a decrease in additive concentration [resulting in] the same or a net decrease in risk to the Torrance Community.” In 1998, therefore, Mobil was claiming at least a 65% Airborne Reduction Factor (ARF), just as it had in 1995. But even this dubious claim is another broken promise. As of 2016, ExxonMobil is claiming only a 40% ARF for the MHF-barrier combination.¹⁶⁸

- **1998-03** Mobil implemented its plan to gut MHF with stunning alacrity.

- 12th: Mobil presents proposed interim and final operating configurations.
- 16th: the Safety Advisor “validates” and approves Mobil’s plan (in just four days).
- 24th: Interim mitigation features, acid settler pans and acid circulation pump shrouds, are in place and inspected by Safety Advisor and *the Torrance Fire Department*, represented by Battalion Chief Kenneth M. Hall^{169, 170} and Dr. John D. Kulluk,^{171, 172} Hazardous Materials Analyst for TFD, (8 days after approval). The Safety Advisor had, at some point, “identified a requirement for the installation of additional mitigation features to achieve the target Alkylation Unit HF concentration.” (p. 77) This was an inspection of the interim measures.
- 25th: *The City [of Torrance]* concurs with the final and interim operating strategies. *Torrance Fire Chief R. Scott Adams* delivered the city’s “concurrence” report (Ref. 844) on the same day, “Proposed MHF Alkylation Process Enhancements.”

Maher’s 1999 report doesn’t mention what role the City Council (CC) and Mayor of Torrance played. Four of the six city councils members at the time, Dan Walker, Don Lee, Marcia Cribbs¹⁷³ and George Nakano,¹⁷⁴ say they have no memory of MHF’s operational failure or the reduction in additive. But Safety Advisor Steve Maher and then TFD Chief R. Scott Adams claim that the CC gave approval.

- **1998-05** The slashing of MHF additive is completed.
 - 15th: Mobil completed the installation of the barriers and shrouds and “TFD and the Safety Advisor performed a detailed inspection of the final added mitigation features.” (acid circulation pump barriers and the flange shrouds).
 - 17th: “The Safety Advisor identified that Mobil met its Consent Decree obligations (with the enhanced mitigation features) and recommended allowing” Mobil to do whatever the heck it wanted to do. At that’s what it did. MHF’s operational failure and the slashing of the additive was never made public. As of this writing, it is unknown if the Torrance City Council was informed or involved in the decision. Maher and Adams claim that it was, City Council members Don Lee and Dan Walker have no memory of it, and there is no reference to this subject in the minutes of City Council meetings at the time. The secret 1987 Stipulation and Protocol was a court document authorizing an additional year for the Consent Decree and further activity and charges by the Safety Advisor. Since our requests for this document have gone unanswered, it is unknown if it contains information about the reduction in additive concentration and addition of barriers.
- **1998-12** Mobil and the City of Torrance agree to extend the 1997 Consent Decree Stipulation and Non-Consent Decree Protocol:¹⁷⁵ “the non-Consent Decree protocol, as well as the Court’s jurisdiction over Consent Decree matters in light of the fact that the safety advisor’s reports and the implementation of all the safety advisor’s final recommendations had not yet been completed.” It is unknown if these recommendations had anything to do with the additive concentration change or barrier additions.
- **2000-08-02** Mobil and the City of Torrance agree to the Consent Decree Stipulation and Order re: Termination of the Consent Decree,¹⁷⁶ on August 9, 2000. They agreed to stay under the Court’s jurisdiction until Mobil implemented the many Safety Advisor Final Recommendations that had not been done. It was made retroactive to December 31, 1998. The court also “encouraged” the parties to continue the 1997 non-Consent Decree protocol. It was anticipated that these would be completed by the end of 2000. But they weren’t.
- **2010-01-15 The last Consent Decree Issue is closed out.**¹⁷⁷ ExxonMobil made a request to close the Consent Decree. It is unknown if that was ever done. Whenever the subject of the Consent Decree comes up, such as at an ExxonMobil Community Advisory Panel meeting the author attended in 2016, ExxonMobil claims that it was never closed.

At the end of the May 1998, after enabling the adoption of barely modified HF and barriers, Torrance Fire Chief and CEO R. Scott Adams retired.¹⁷⁸ In August 1998, retired Chief Adams established his own firm, R. Scott Adams, Consultant. He subsequently received NIMS/ICS Training and Certification as a team member with Safety Advisor Steve Maher's firm, Risk Management Professionals (RMP).¹⁷⁹ Adams moved on to consult for Steve Maher and RMP, including an attempt in 2008 to convince Bakersfield of sulfuric acid's dangers and to sell them on the benefits of MHF at the Big West Refinery.¹⁸⁰ "A surprising finding was that sulfuric acid could also form a mist of toxic gases that can travel downwind if spilled, according to Adams. 'That gets ignored sometimes in the counter arguments and that needs to be compared,' [Adams] said." Bakersfield residents wisely rejected MHF. Adams was profiled on RMP's website page "Key Personnel" at least as late as 2011.¹⁸¹

In 1999, Safety Advisor Steve Maher, TFD Battalion Chief and Hazardous Materials Administrative Officer Kenneth M. Hall, former TFD Chief R. Scott Adams, and Carolin A. Keith, the Public Affairs Manager of the Torrance Mobil Refinery, joined together in perfect harmony to write a "Practical Guide to Risk Management Communications" for the industrial risk communicator, published by RMP in January 2000.¹⁸² One chapter is titled, "Trust and Credibility." Their brand of risk communication was to leave South Bay residents in the dark about MHF's operational failure and the slashing of the MHF additive. The authors credit Dr. Peter Sandman for inspiring them with his theories on how to appease and minimize public "outrage" and "hysteria" over industrial hazards.¹⁸³ One benefit of their approach was a "decreased potential for legal action by the community to enforce what it considers to be an equitable risk balance." "This has occurred," they warned the reader, with a footnote referencing the Consent Decree.

TFD Battalion Chief Hall worked closely with Chief Adams and the Safety Advisor during the Consent Decree. He participated in approving the modified and even more dangerous MHF alky unit after the 1997 operational failure. Hall then followed Adam's example, retiring in June 2003 to create his own firm, K. M. Hall Consulting and to work as a consultant for Safety Advisor Steve Maher's firm, Risk Management Professionals. Hall was profiled on RMP's website page "Key Personnel" at least as late as 2011.¹⁸⁴

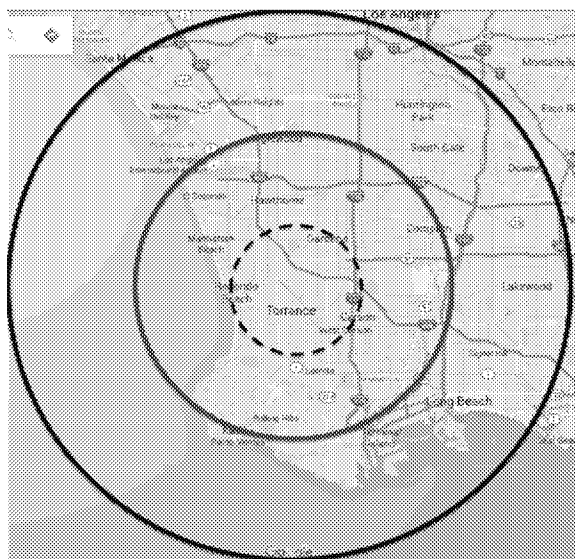
- **2015-02-18** An explosion at the ExxonMobil refinery and a near miss on a tank containing 50,000 lb. of MHF woke up the slumbering community.¹⁸⁵ The Torrance Refinery Action Alliance was formed within the next month and community members became active in keeping an eye on the refinery.
- **2015-10-13** During the October 13, 2015 City of Torrance MHF Workshop the Safety Advisor showed a slide that listed this October 1999 report, "Evaluation of Modified HF Alkylation Catalyst (Analysis of proposed additive concentration changes)."¹⁸⁶ Maher did not mention it in his remarks, but this author recognized its significance. The existence of this report had never been revealed before, although this author suspected that the MHF additive had been reduced based on research reports, patents, and material safety data sheets found online. That night the City of Torrance was persuaded by concerned residents to join with the AQMD on a study of MHF alternatives. As of April 8, 2016, the study had begun with the choice of a consulting firm whose founder has connections to ExxonMobil.

Conclusion

Following the 1987 HF leak at the Torrance refinery, six significant efforts were begun that might have eliminated HF:

Torrance Measure A, SCAQMD Rule 1410, the Torrance public nuisance lawsuit, the Torrance Chemical Review Board ordinance, California Assemblyman Tucker's bill, and the Torrance-Mobil Consent Decree.

But all failed to do so because of a lack of will, persistence, and too little community participation and influence. Clearly, the City of Torrance did not intend to force Mobil to eliminate HF with the Consent Decree, or they might have succeeded.^{187,188} City goals were to enact general safety improvements and to allow Mobil to implement MHF. According to Dan Walker, Mobil spent a total of \$1 billion on refinery improvements.¹⁸⁹ Mobil's 1990 and 1994 safety claims for MHF were false, because MHF with more than 10-15% additive cannot function as an alkylation catalyst. Mobil's 1994 claim that MHF with 30% additive is no more dangerous than sulfuric acid was a double fiction, because sulfuric acid does not form a dangerous vapor cloud upon release. Mobil's 1998 safety promises for MHF with 10% additive were based on unproven proprietary barrier technology. The City of Torrance accepted all of Mobil's questionable claims. They agreed not to inform the public of MHF's operational failure, the additive reduction, and modifications and extensions to the Consent Decree. It is unknown which staff and elected representatives participated in this fiasco, outside of Fire Chief R. Scott Adams, Battalion Chief Kenneth Hall, and City Manager LeRoy Jackson.¹⁹⁰ Mayor P. Furey, however, stated "the record shows" that the City Council and Mayor Dee Hardison were briefed on MHF's failure, the slashing of the additive, and Consent Decree modifications.¹⁹¹ Mayor Furey has not responded to requests to provide said records. City of Torrance elected officials have also not responded to TRAA's 2015 request for an investigation, except to informally ask us not to demand one. The following scenario map gives a clue as to why.



Worst Case Scenario Map reflecting the actual risk MHF poses to the community.

The contents of one acid settler are released within 10 minutes on a calm day. Emergency measures fail. (EPA rules). Release amount: 50,000 lb. MHF w/ 10% additive. Assuming a 26% reduction in airborne acid is achieved compared to pure HF. (This is very generous. It would actually be ~10%).

7.7 mi. radius zone (red) life threatening for most people w/ short term exposure (50 ppm, ERPG-3) 13.7 mi. radius zone (black) of serious & irreversible health effects for most people with short-term exposure (20 ppm, ERPG-2). Exposure depends on wind direction

The inner dashed circle is ExxonMobil's own low-ball worst-case-scenario: 5,200 lb. MHF released, with an unknown Airborne Reduction Factor (Mobil claimed 65% in 1994 for 30% additive): 3.2 mile ERPG2 radius.

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- ¹³⁹ 2008-05-16 The Big West debate: Who's right? STACEY SHEPARD, Daily Californian, [MHF on DHS COI list] <<http://www.bakersfield.com/news/2008/05/16/the-big-west-debate-who-s-right.html>>

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¹⁴⁹ Don Lee, former Torrance City Councilman, 1992-2000, speaking at the Torrance ExxonMobil Refinery Community Advisory Panel meeting, November 17, 2015. The concentration "started at 50% [in 1990] then settled at 30%" by 1995. Author was present.

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¹⁵² Dr. Ronald Koopman, Personal email sent to Nick Green, Dec 17, 2015 at 1:03 PM and forwarded to Sally Hayati that day.

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¹⁵⁴ The author has requested that Torrance City Manager LeRoy Jackson send a copy of the Consent Decree Stipulation and Non-Consent Decree Protocol, December 1997. He has not responded. But it is discussed on page 59 of this court document: Consent Decree, Stipulation and Order re: Termination of the Consent Decree, August 9, 2000, Filed with the Superior Court of the State of California for the County of LA, Case No. C719 953. <<http://bit.ly/1OjsWGW>>. Also Pages 57-62 in: Workshop regarding ExxonMobil's use of MHF catalyst, October 13, 2015, City of Torrance Staff Report, <http://torrance.granicus.com/MetaViewer.php?view_id=8&event_id=2620&meta_id=236223>.

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¹⁶² "If 10% or 20% Sulfolane [additive] is used there is very little difference between HF and MHF... in terms of concentration and travel distance downwind. At 10% concentration there is only 10% rainout... 90% of the MHF travels downwind. [10% additive poses] a much bigger hazard [than 30% additive]." Personal email, sent from Koopman to Nick Green, Dec 17, 2015 at 1:03 PM.

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- ¹⁶⁷ Even Mobil never did lab or field-testing for the unique condition claimed to enhance acid rainout: a very short distance from the MHF unit to barriers (1-3" distances). A software model with acknowledged inaccuracies for very close barriers was instead used to simulate the effects. MHF with 10% additive was likely never tested under any conditions. Data is never cited for additive concentrations below 21%. This is true for patent data and data cited in the safety advisor's report. Torrance Refinery Safety Advisor Project, Steve Maher, "Evaluation of Modified HF Alkylation Catalyst (Analysis of proposed additive concentration changes)," October 1999. <<http://bit.ly/1Nzic8W>>
- ¹⁶⁸ Personal Conversation with Ms. Vanessa Sutherland, Chair of the Chemical Safety Board, 1/13/2016.
- ¹⁶⁹ Risk Management Professionals Key Personnel, cached by Zoom Information Inc. on 4/6/2011, <http://www.zoominfo.com/CachedPage/?archive_id=0&page_id=2085872029&page_url=/www.rmpcorp.com/briefsynopsisofteamandaffiliates.htm&page_last_updated=2011-04-06T18:11:17&firstName=Kennith&lastName=Hall>. After his retirement in June 2003 (see: <https://www.torranceca.gov/PDF/cc06242003.pdf>), Fire Marshall Kenneth M. Hall followed R. Scott Adams's example, creating a company, K. M. Hall Consulting (KMHall2@cox.net) and working for Safety Advisor Steve Maher's firm, Risk Management Professionals. Hall "retired from the City of Torrance Fire Department with 43 years experience in all phases of the Fire Service. At the time of retirement, Chief Hall held the rank of Battalion Chief and was serving as the Fire Marshall for the City of Torrance, California."
- ¹⁷⁰ Risk Management Professionals Publications, "Practical Guide to Risk Management Communications," AUTHORS: Steven T. Maher, (Safety Advisor), Retired TFD Chief R. Scott Adams, TFD Battalion Chief Kenneth M. Hall (both of whom closely oversaw the Consent Decree), Carolin A. Keith (Public Affairs Manager of the Torrance ExxonMobil Refinery. See: <http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/remediation/scp/fact_sheet/exxon_mobil_final_fact_sheet2.pdf>.). Cached by Zoom Information Inc. on 4/6/2011. <http://www.zoominfo.com/CachedPage/?archive_id=0&page_id=1897363035&page_url=/www.rmpcorp.com/Publications_PracticalGuideToRiskManagementCommunications.htm&page_last_updated=2011-04-06T18:11:17&firstName=Kennith&lastName=Hall>. Also see: <http://www.amazon.com/gp/product/0967872707?psc=1&redirect=true&ref=oh_aui_detailpage_o00_s00>.
- ¹⁷¹ Torrance Refinery Safety Advisor Project, Steve Maher, 1999, op cit. (p. 77).
- ¹⁷² A Resolution of the City Council of the City of Torrance Honoring John D. Kulluk, Ph.D., Upon His Retirement from the City After 22 Years of Service, Resolution number 2011-58, <http://torrance.granicus.com/MetaViewer.php?view_id=8&clip_id=9537&meta_id=167807>. [Hired March 13, 1989, as the first Hazardous Materials Analyst for the City Fire Department. Oversaw the Consent Decree. Retired May 31, 2011. He had a "common sense approach" to hazardous materials issues.] John D. Kulluk, Ph.D. Chemistry 1974, U. of Pittsburg, Lives in LA, jdkulluk@hotmail.com, <http://www.chem.pitt.edu/sites/default/files/users/monaco/98984_Chem%20Newsletter_rev%20%232.pdf>. Member of ExxonMobil CAP, 2005-2007, <<http://www.exxonmobil.com/NA-English/Files/17363ExxonMobilW06.pdf>>. Created presentation "Refinery Basics," in 2007, http://www.calcupa.net/conference/conf_files/2007/royal-monday/RefineryBasics2007.ppt. Link broken. Available <<http://www.authorstream.com/Presentation/tinpham36-2344588-refinerybasics2007/>>.
- ¹⁷³ 2015-12-01 "EPA investigating ExxonMobil for understating Torrance refinery risk," Nick Green, Daily Breeze, <<http://www.dailybreeze.com/general-news/20151201/epa-investigating-exxonmobil-for-understating-torrance-refinery-risk#.VI55GsnSVIY.email>>.
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- ¹⁷⁵ Consent Decree, Stipulation and Order re: Termination of the Consent Decree, August 9, 2000, Filed with the Superior Court of the State of California for the County of LA, Case No. C719 953. <<http://bit.ly/1OjsWGW>>.
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- ¹⁷⁷ Workshop regarding ExxonMobil's use of MHF catalyst, October 13, 2015, City of Torrance Staff Report, Page 63. <http://torrance.granicus.com/MetaViewer.php?view_id=8&event_id=2620&meta_id=236223>.
- ¹⁷⁸ R. Scott Adams, Public Safety & Fire Services Consultant at R. S. Adams, Consultant, since August 1998. Fire Chief and CEO of the City of Torrance Fire Department, January 1987 – May 1998. <<https://www.linkedin.com/in/r-scott-adams-6403a734>>.
- ¹⁷⁹ R. Scott Adams, Public Safety & Fire Services Consultant at R. S. Adams, Consultant, since August 1998. Fire Chief and CEO of the City of Torrance Fire Department, January 1987 – May 1998. <<https://www.linkedin.com/in/r-scott-adams-6403a734>>.
- ¹⁸⁰ 2008-05-16 The Big West debate: Who's right? STACEY SHEPARD, Daily Californian, [MHF on DHS COI list] <<http://www.bakersfield.com/news/2008/05/16/the-big-west-debate-who-s-right.html>>
- ¹⁸¹ Risk Management Professionals Key Personnel, cached by Zoom Information Inc. on 4/6/2011, Retired TFD Fire Chief R. Scott Adams and retired TFD Battalion Chief Kenneth M. Hall. <http://www.zoominfo.com/CachedPage/?archive_id=0&page_id=2085872029&page_url=/www.rmpcorp.com/briefsynopsisofteamandaffiliates.htm&page_last_updated=2011-04-06T18:11:17&firstName=Kennith&lastName=Hall>

¹⁸² Risk Management Professionals Publications, "Practical Guide to Risk Management Communications," AUTHORS: Steven T. Maher, (Safety Advisor), R. Scott Adams and Kenneth M. Hall (retired Chief and Battalion Chief of the Torrance Fire Department who closely oversaw the Consent Decree), Carolin A. Keith (Public Affairs Manager of the Torrance ExxonMobil Refinery. See: <http://www.swrcb.ca.gov/rwqcb4/water_issues/programs/remediation/scp/fact_sheet/exxon_mobil_final_fact_sheet2.pdf>.). Cached by Zoom Information Inc. on 4/6/2011.

¹⁸³ Responding to Community Outrage: Strategies for Effective Risk Communication by Peter M. Sandman, Ph.D., 1993, <<http://psandman.com/media/RespondingtoCommunityOutrage.pdf>>.

¹⁸⁴ Risk Management Professionals Key Personnel, cached by Zoom Information Inc. on 4/6/2011, Retired TFD Fire Chief R. Scott Adams and retired TFD Battalion Chief Kenneth M. Hall. <http://www.zoominfo.com/CachedPage/?archive_id=0&page_id=2085872029&page_url=/www.rmpcorp.com/briefsynopsisofteamandaffiliates.htm&page_last_updated=2011-04-06T18:11:17&firstName=Kennith&lastName=Hall>

¹⁸⁵ 2015-09-30, "Federal review: Calif. refinery explosion could have been much worse," ANNA WERNER, CBS News, <<http://www.cbsnews.com/news/exxonmobil-explosion-could-have-been-much-worse-reports-say/>>.

¹⁸⁶ Torrance Refinery Safety Advisor Project, Steve Maher, "Evaluation of Modified HF Alkylation Catalyst (Analysis of proposed additive concentration changes)," October 1999. <<http://bit.ly/1Nzic8W>>.

¹⁸⁷ "We have done nothing in secret," Mayor Dee Hardison announced at the end of 1994. "We wanted to make sure that whatever was done at the refinery was the safest alternative," said Michael Leslie, an attorney for the city. City Fire Chief R. Scott Adams supported changing the Consent Decree, since "sticking with hydrofluoric could prove safer than a costly switch to sulfuric acid." 1994-12-05, "Torrance Defends Changes in Safety Pact With Mobil," DEBORAH SCHOCH, LA Times, <http://articles.latimes.com/1994-12-15/news/cb-9181_1_safety-pact>

¹⁸⁸ "And sulfuric acid poses its own risks, such as boosting truck traffic, Adams said. Mobil says that about 630 trucks per month would be required to transport sulfuric acid to the refinery, compared to only two to three trucks per month of hydrofluoric acid today because the process uses larger amounts of sulfuric." Adams was misinformed. Sulfuric acid instead would be piped in using an existing pipeline from Carson refineries, or could be produced onsite. FROM: 1994-12-08 "SOUTH BAY / COVER STORY: Acid Test Torrance must decide a vexing question: Is it safe for the Mobil oil refinery to continue using a highly toxic chemical?" DEBORAH SCHOCH, LA Times, <http://articles.latimes.com/1994-12-08/news/cb-6479_1_hydrofluoric-acid/3>.

¹⁸⁹ Personal communication between Dan Walker and the author on 2015-08-20.

¹⁹⁰ 2015-12-01 "EPA investigating ExxonMobil for understating Torrance refinery risk," Nick Green, Daily Breeze, <<http://www.dailybreeze.com/general-news/20151201/epa-investigating-exxonmobil-for-understating-torrance-refinery-risk#.VI55GsnSVIY.email>>.

¹⁹¹ Chemical Safety and Hazard Investigation Board, Public Meeting, January 13, 2016, ExxonMobil Refinery Explosion, Torrance, CA, Video of meeting at <<https://www.youtube.com/watch?v=bwP2wL0D678>>. Comments to the CSB by Torrance Mayor Patrick Furey.